**Name:** _____ **Group:** /   **Mark:**   /50 **Grade:**

Answer all questions.

1.  (a)  An operating system is required to manage interactions between the user, the application software and the hardware. Describe **three** functions the operating system provides.          [6]

    (b)  The operating system may use a paging table. Explain what is meant by a paging table is and why it is necessary.          [2]

    If the demands for memory within a system exceed the available RAM, an area of the hard drive can be designated as virtual memory to cope with the demand.

    (c)  Explain why using virtual memory is not as effective as adding more RAM.          [2]

2.  (a)  The CPU must be able to process interrupts. State how a CPU determines if an interrupt has been raised.          [2]

    (b)  Explain how it is possible for a single processor to appear to be multi-tasking.          [2]

(c)  What are the aims of a scheduling algorithm in a multi-tasking system?    [2]

(d)  Describe the **round robin** scheduling algorithm used by a multi-tasking operating system.    [2]

3.  Embedded systems are used in a car to monitor the car's performance and improve the driving experience, using sensors as input.

Identify **two** features of embedded systems which make them suitable for this task.    [2]

| | |
|---|---|
| The hardware needs to run a specific application reliably | ✓ |
| The hardware needs to run a variety of applications | |
| The OS and applications can be optimised for the hardware | ✓ |
| Applications are held in RAM | |
| A sophisticated user interface is possible | |

4.  (a)  Explain the term **bytecode**.    [2]

(b)  Explain how bytecode improves portability.    [2]

(c)  Explain what is meant by a **virtual machine**.    [2]

(d)  Explain how the use of the virtual machine protects the user from potential effects of a virus.    [2]

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5. (a) Explain the difference between systems software and applications software. [2]

(b) Compare the benefit of disk defragmentation for files stored on a magnetic hard drive and files stored on a solid state drive. [2]

(c) Cathryn is a teacher who wants her students to be able to manipulate photographs using a graphics package. Explain why she might choose proprietary software for this task. [2]

6. Jacob is writing some assembly code as follows:

```
    INP
    STA x
    INP
    ADD x
    OUT
    HLT
x   DAT
```

(a) What type of translator converts assembly code into machine code? [1]

(b) Explain why it is easier for Jacob to write in assembly code than to write machine code. [2]

7. Explain the difference between open source software and freeware [2]

8. (a) State what is meant by utility software. [1]

3

(b) State and explain **two** examples of utility software used to protect a desktop computer from attacks by malicious code. [4]

9. A coffee shop owner is looking for some new software to run on her existing till.

(a) Describe **three** factors the owner should consider when selecting the new application software. [6]

[Total 50 marks]

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